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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/532,022	03/21/2000	Yuji Sudoh	35.G2558	7470
5514	7590	09/30/2004	EXAMINER	
FITZPATRICK CELLA HARPER & SCINTO			NGUYEN, HUNG	
30 ROCKEFELLER PLAZA			ART UNIT	
NEW YORK, NY 10112			PAPER NUMBER	

2851

DATE MAILED: 09/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/532,022

Applicant(s)

SUDOH ET AL.

Examiner

Hung Henry V Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 August 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 25-48 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 25-48 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 31, 2004 has been entered.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 25-48 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure of the specification lacks adequate support for the claimed provision of "projection optical system including a diaphragm in a vacuum" (see claim 1 for example). The applicants stated that support for the claimed limitations can be found in the specification as filed. However, the Examiner was unable to find the claimed limitations as mentioned in the specification except for an ambiguous statement stating "*the present invention is applied to an exposure optical system used in the atmosphere, the present is also applicable to an exposure apparatus using EUV or X-rays. In that case, the present*

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*invention is more effective, because exposure is performed in vacuum, and a natural radiation effect is reduced more, as compared with a case in which exposure is performed in the atmosphere”* (see present specification, page 12, lines 13-20). This paragraph is not even remotely related to the limitations as recited in the instant independent claims 25 and 37. The applicant is reminded that when claimed elements that are not clearly discussed in detail, this falls under 112, first paragraph, applicant's disclosure is lacking in this aspect and for this reason, one having ordinary skill in the art is unable to ascertain the particularities and the highlights of applicant's claimed invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 25-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 25 and 37, the recitation of “of “projection optical system including a diaphragm in a vacuum” is vague and indefinite for the above reasons (see rejection under 35 U.S.C. 112, first paragraph”.

#### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 25-29, 31-33, 36-41, 43-45, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al (U.S.Pat. 4,475,223) in view of Ushida et al (U.S.Pat. 5,530,518) and further in view of Shiraishi (U.S.Pat. 6,020,950) and further in view of Sato (U.S.Pat. 5,142,148)

With regard to claims 25-29, 31-33, 36-41, 43-45 and 48, Taniguchi et al discloses an exposure apparatus for performing exposure using X-rays (6) in a vacuum (2) (see col.4, lines 9-11) and comprising a projection optical system for projecting a predetermined pattern formed on a mask onto a substrate (see fig.4). Taniguchi lacks to show “a diaphragm arranged in vacuum and a cooling device which cools the diaphragm”. Ushida et al (fig.1) discloses an projection exposure apparatus having a projection optical system (10) for projection a pattern formed on a reticle (9) onto a photosensitive substrate (11) and a diaphragm (10a) for setting the numerical aperture of the projection optical system. Shiraishi (figs 4 and 5) teaches a projection optical system having a cooling member (see fig.5) for cooling the light shielding plate arranged therein whereby “the system is free from heat generation caused by light absorption” (see col.5, lines 15-18) wherein the cooling means comprises a cooling fluid circulation system (Ko,Ki). Sato discloses an exposure apparatus where the aperture diaphragm is disposed in a vacuum for preventing from being contaminated (see col.2, lines 3-16). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Taniguchi, Ushida, Shiraishi and Sato to obtain the claimed invention.

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With respect to claims 31 and 43, it is noted that the temperature of fluid is controlled (see col.14, lines 5-7). Therefore, a temperature sensor is an inherent device of the cooling means to detect the temperature information of the light shielding plate.

As to claims 32-33, and 44-45, it is the examiner's position that it would have been obvious to a skilled artisan to preferably disposed the temperature sensor on the side facing the substrate. In other words, the sensor is disposed on a plane opposite to the light source whereby the sensor is not influenced by the exposure beam.

It would have been obvious to a skilled artisan to employ a diaphragm as taught by Ushida into the exposure device of Taniguchi for adjusting the numerical aperture thereby improving the resolution of the images to be printed and to utilize the cooling means as taught by Shiraishi into the diaphragm of Ushida so that the numerical aperture diaphragm may be prevented from increasing its temperature due to absorption of light and thus a deviation of the projection optical system can be avoided and to place the diaphragm in a vacuum as suggested by Sato so that the diaphragm is prevented from damage caused by contamination.

7. Claims 34-35 and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi in view of Ushida et al (U.S.Pat. 5,530,518) and further in view of Shiraishi (U.S.Pat. 6,020,950) and further in view of Sato and further in view of Nishi et al (U.S.Pat. 5,894,341).

As to claims 34-35, and 46-47, Taniguchi as modified by Ushida, as well as Shiraishi and Sato comprising substantially of the limitations of the instant invention as discussed above except for the aperture diaphragm comprises an iris diaphragm and a turret having a plurality of openings. However, a variable aperture of a turret type is known per se. For instance, Nishi

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teaches an aperture comprising “iris diaphragm and a turret with a plurality of openings”. (see figs.2a, 2b). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a variable aperture of a turret type as taught by Nishi in the device of Ushida as modified by Shiraishi and Sato for varying the numerical aperture of the projection optical system.

As to claims 30 and 42, Taniguchi as modified by Ushida et al, Shiraishi and Sato lacks to show a cooling device with a “Peltier element”. Using a “Peltier element” in a cooling mechanism is also well known in the art. For example, Nishi teaches Peltier element (30) for cooling the bottom face of the temperature adjustment plate (20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ “Peltier element” as taught by Nishi into the cooling device of Shiraishi for the purpose of cooling the aperture stop and thus the aperture stop can be prevented from increasing its temperature due to absorption of light.

***Response to Amendment/Applicant's arguments***

8. Applicant's amendment filed August 3, 2004 has been entered. Claims 25 and 37 have been amended. Applicant's arguments regard to prior art of record, have been carefully reviewed but they are not found persuasive. Claims 25-48 are rejected under 35 U.S.C. 112, first and second paragraph since the specification of the present application fails to disclose the details of the arrangement of the diaphragm in the projection optical system, as claimed. The Examiner contends that it would require undue experimentation for one having ordinary skill in the art to make and use the claimed invention for the reason set forth in sections 2-4.


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Turning to the prior art rejection, applicant's arguments with respect to amended claims have been carefully reviewed but have been traversed as set forth above.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Henry V Nguyen whose telephone number is 571-272-2124. The examiner can normally be reached on Monday-Friday (First Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on 571-272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
**Hung Henry V Nguyen**  
**Primary Examiner**  
**Art Unit 2851**

hvn  
9/23/04